

CLAIMS:

What is claimed is:

1 1. An apparatus comprising:  
2 an analog photocell adapted to capture light energy incident  
3 upon it as an analog signal;  
4 a sample-and-hold amplifier coupled to said photocell and  
5 adapted to store said analog signal;  
6 a digital converter coupled to said amplifier said converter  
7 transforming said analog signal into a digital value, said value  
8 proportional to the amount of said light energy.

1 2. An apparatus according to claim 1 wherein said digital  
2 converter includes:  
3 a voltage controlled oscillator;  
4 a counter coupled to said oscillator, said oscillator setting  
5 the rate of increase of said counter, said rate proportional to  
6 said stored analog signal.

1 3. An apparatus according to claim 2 further comprising:  
2 a register coupled to said counter, said register receiving  
3 said digital value as an output of said counter at the end of a  
4 predetermined time period.

042390.P4577

1 4. An apparatus according to claim 2, wherein said digital  
2 converter includes:

3 a scaling signal supply, said supply adapting the output of  
4 said oscillator in a dynamic range consistent with ambient  
5 lighting to which said photocell is exposed.

1 5. An apparatus according to claim 1 utilized in an imaging  
2 device.

1 6. A system comprising:  
2 an array of analog photocells;  
3 a first array of shift cells, each of said first array  
4 shift cells coupled to one of said analog photocells; and  
5 a second array of shift cells coupled to said first array  
6 shift cells such that each first array shift cell is coupled to  
7 one of said second array shift cells.

1 7. A system according to claim 6 further comprising:  
2 a differential operational amplifier having two input  
3 terminals, one input terminal coupled to the terminating output  
4 of said first array of shift cells, the other input terminal  
5 coupled to the terminating output of said second array of shift  
6 cells, said amplifier providing a signal representative of the

7 difference between said first array terminating output and said  
8 second array terminating output.

1 8. A system according to claim 7, wherein a set of such  
2 signals, said set as large as the size of said first array,  
3 represent a delta frame of an image.

1 9. A system according to claim 7, wherein said second array  
2 terminating output represents a key frame of an image when said  
3 system is first initiated.

1 10. A system comprising:  
2 a first array of shift cells, the output of each of said  
3 first array shift cells coupled to the input of the next of said  
4 first array shift cells;  
5 a second array of shift cells; and  
6 an array of analog photocells, each of said photocells  
7 coupled to a corresponding one of said second array shift cells.

1 11. A system according to claim 10 comprising:  
2 a differential operational amplifier, having two input  
3 terminals, one input terminal coupled to the terminating output  
4 of said first array of shift cells, the other input terminal  
5 coupled to the terminating output of said second array of shift

6 cells, said amplifier providing a signal representative of the  
7 difference between said first array terminating output and said  
8 second array terminating output.

1 12. A system according to claim 11, wherein a set of such  
2 signals, said set as large as the size of said first array,  
3 represent a delta frame of an image.

1 13. A system according to claim 11 further comprising:  
2 a regeneration amplifier having an input terminal coupled  
3 to the terminating output of said second array of shift cells,  
4 the output of said regeneration amplifier coupled to the  
5 initiating input of said first array of shift cells, said  
6 regeneration amplifier enhancing the terminating output of said  
7 second array of shift cells.

1 14. An apparatus comprising:  
2 a digital photocells, representing the light intensity of  
3 an area of an image as a pixel value;  
4 a holding register coupled to said photocell, said register  
5 receiving said value; and  
6 a subtraction unit coupled to both said photocell and said  
7 holding register, the subtraction unit differencing a current

8 pixel value of said photocell with a previous pixel value as  
9 stored in said holding register.

1 15. An apparatus according to claim 14 further comprising:

2        an output bus; and

3 a multiplexer coupled to said subtraction unit and said

4 digital photocell, said multiplexer selectively providing one of

5 the output of said subtraction unit and the value in said

6 digital photocell to said output bus.

Figure 1 displays 12 histograms showing the distribution of the number of non-zero elements in the vector  $x$  for different values of  $n$  (ranging from 1 to 12). The histograms are arranged in a 6x2 grid. The x-axis for all histograms is 'Number of non-zero elements' (ranging from 0 to 12), and the y-axis is 'Frequency' (ranging from 0 to 10). The distributions are unimodal and centered around 6, with the peak frequency increasing as  $n$  increases.